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TESTING ALTERNATIVE MODELS OF RECIPROCITY AGAINST INTERACTION DURING THE COLD WAR

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Abstract. Three models of reciprocity—simple, trend, and comparative—are applied to events data which describe interaction between the United States and the Soviet Union during the Cold War. The comparative reciprocity model—which predicts that change in each actor's behavior will be based on prior differences in the rivals' actions—received the greatest, although limited, support. There was little agreement in the results of the three reciprocity models for specific years. Overall, while there is some evidence of reciprocity when using either the simple reciprocity or the comparative reciprocity model, reciprocity does not appear to have been a robust process in U.S.-Soviet interaction. It tended to occur most often at times of high tension and conflict.

This paper reports the results of research which tests the relative adequacy of three different models of reciprocity for explaining the actions of American and Soviet leaders.[1] The study focuses on interaction between the United States and the Soviet Union during the Cold War. Although the Cold War has ended with the break-up of the Soviet Union, information about the interaction which occurred during that rivalry can contribute to our general understanding of reciprocity between nations, especially those that are rivals.

THEORY AND RESEARCH ON RECIPROCITY

The phenomenon of reciprocity has received a great deal of scholarly attention. This is especially true with respect to the study of interactions between national leaders (e.g., Keohane, 1986; Goldstein and Freeman, 1990). Most of the work on this topic has focused on the occurrence and strength of reciprocity; evidence indicates a general tendency of national leaders to reciprocate the actions of other nations toward their own nation (Patchen, 1993). A strategy of reciprocity may be followed by actors because they have learned that it is an effective strategy for producing high payoff outcomes (Axelrod, 1984; Patchen, 1987). Those following a policy of reciprocity also may be influenced by norms of fairness: that people should help and not hurt those that help them (Gouldner, 1960) and should hurt someone who has hurt them (Tedeschi, Smith and Brown, 1974).

There also has been some attention to the conditions that may affect the occurrence of reciprocity—including the goals of the actor

and the perceived goals of the adversary (Gamson and Modigliani, 1971; Leng, 1993); the relative power of the adversaries (Patchen, 1991); and the extent to which rewarding behavior by the adversary is intentional and is costly to the adversary (Larson, 1988).

While the general phenomenon of reciprocity has not lacked attention, there has been relatively little attention in the literature to the *nature* of reciprocity when it does occur. Usually reciprocity has been discussed in terms of simple tit-for-tat: if side A acts in a rewarding or cooperative way toward side B, B responds in a similar (rewarding) way; similarly, if A punishes or acts conflictively towards B, B responds in a similar (conflictive) way.

However, some scholars have suggested that an actor does not respond (whether reciprocally or not) to the absolute nature of the other's last action. Rather, his or her response is based on an interpretation of the other's actions and of what these actions indicate about the other's objectives, intentions, and strategies (Coddington, 1968; Druckman, 1978; Snyder and Diesing, 1977; Larson, 1988). Such an interpretation may be based not merely on an opponent's single most recent action but, rather, on his or her sequence of actions and particularly on any trend in these actions. Thus, in discussing the strategy choices made by national leaders, Snyder and Diesing (1977:288) assert, "...if A's strategy is contingent on what type of response B is making—offer concessions if B is reasonable, dig in and prepare for war if B is stubborn—the question will be, 'what type of response pattern is B showing.' Is he getting more reasonable or is he getting more stubborn?"

From this viewpoint, reciprocation, when it occurs is likely to come as a response to the *direction of movement* by the other side. If the other has changed in a more positive (cooperative) direction, the actor will himself act more cooperatively than before. If the other has changed in a more negative direction, the actor will, in turn, become more conflictive. The "trend reciprocity" model (to be discussed below) reflects this view of how reciprocity operates. A related perspective that focuses on changes in the other's behavior is provided by a "rational expectations" model (Williams and McGinnis, 1988). This model proposes that national leaders respond not to the actual actions of another nation (e.g., their level of spending for arms) but to an expected level of action and thus to changes or innovations in the expected level of behavior.

An alternative perspective is that an actor interprets the recent action(s) of a partner primarily in terms of a *comparison* between his own actions and those of the other. Theoretical treatments of the bargaining process suggest that each bargainer monitors the com-

parison between his (her) own behaviors and those of the opponent (Coddington, 1968; Winham, 1977). On the basis of this comparison the actor can judge whether the other is being cooperative (relative to himself) or conflictive (relative to himself). If the other has been more cooperative than himself recently, he may reciprocate by moving in the direction of greater cooperation. If the other has been more conflictive than himself, he may reciprocate by becoming more conflictive himself.

The notion that interpretation of and reaction to the other side's behavior results from comparison to one's own behavior has been applied to Soviet-American interactions by several scholars. In constructing a theoretical model to predict the actions of Soviet and American leaders during the Cold War, Gamson and Modigliani (1971) argue that when one superpower acted in either an accommodative or belligerent way, the interpretation and reaction of the rival nation's leaders depended in part on their own nation's recent behavior. Larson (1988) also argues that the interpretation of a given nation's actions by another nation's leaders depends on the context of the other nation's actions. She illustrates this point by describing how, especially during the period of "détente" in the 1970s, both U.S. and Soviet leaders compared the behaviors of the other side to their own actions. Each concluded that the other was being less cooperative than itself and each, therefore, responded with reduced cooperation itself. (The "comparative reciprocity" model, to be presented below, reflects this conception of how reciprocity operates.)

Despite these occasional arguments that actors do not respond simply to the last action of the other party, most systematic studies of reciprocity between national leaders have used a model of simple reciprocity (e.g., Tanter, 1974; Ward, 1982; Zinnes et al., 1982). This type of model predicts the degree to which the actions of each nation's leaders are conflictive versus cooperative as a function of the (prior) action of the rival, usually together with the prior action of their own nation (reflecting an "inertia" effect).

Most studies using such models have found some evidence that the actions of each side were influenced by the actions of the rival, as well as by their own prior actions (e.g., Richardson et.al., 1981; Greffenius 1989). However, not all studies have found evidence that consistently supports the simple reciprocity model (e.g., Bobrow, 1982; Rajmaira and Ward, 1990).

Research using the simple reciprocity model has been handicapped by methodological problems, the most significant of which is the aggregation of behavioral (events) data over given time periods (Dixon, 1988; Goldstein, 1991). The usual practice of aggregating

behavior over standard units of time makes it difficult to establish causation. If side A's average cooperativeness is related to similar measures of Side B's behavior during the same time period (e.g. a quarter-year), it is not known which specific actions by which side came first. When time lags are used to try to solve this problem, there remains uncertainty about what specific behaviors of A may be related to specific behaviors of B, as well as the possibility of "exaggerating the time between behaviors to unreasonable proportions" (Dixon, 1988:240).

Goldstein (1991) has attempted to deal with these methodological problems in a study which tries to predict Soviet and American actions from the past behavior of both sides. Data from several events data sets, spanning three time periods from 1953 to 1989, are aggregated on a daily, as well as on a weekly and monthly basis.

Goldstein found significant reciprocity coefficients in about half of 30 specific tests made for different time periods and data. The past action of the rival was more likely to have significant effects on behavior when data aggregated daily, rather than weekly or monthly, was used. Goldstein states that "with very few exceptions the signs of significant response coefficients ...are positive" (1991: 204-205). Goldstein also concludes that over the course of the Cold War the United States reciprocated consistently at first and then inconsistently while the reverse was true for the Soviet Union.

Dixon (1988) also investigated the relationships between the actions of American and Soviet leaders toward their rival and the immediately preceding actions of the rival and of the actor. He applied logit-linear models to WEIS data from 1966–1978. Dixon found that both conflictive and cooperative actions by American leaders were significantly more likely than not to occur following similar Soviet actions. However, the actions of Soviet leaders were not similarly affected by the prior actions of the United States.

While a simple reciprocity model in some form has been widely used, studies of reciprocity which examine responses to changes in the other side's behavior or to the difference between the two sides' recent behaviors have been few. Goldstein and Freeman (1991) explored both a simple reciprocity model and a "rational expectations" model in which each side reacts to foreign policy "innovations"—i.e. deviations from previous behavior patterns—in a reciprocal way. Using three sets of events data on U.S.-Soviet interactions from 1948 to 1986, they found some support for both models.

Researchers studying arms negotiations have distinguished three models of reciprocity: 1) simple (or "directional") reciprocity, where Side A responds in kind to the absolute nature of Side B's

prior action (e.g., conflictive or cooperative); 2) trend reciprocity, where Side A responds to changes or trends in the pattern of Side B's behavior—i.e. the extent to which side B becomes more cooperative or more conflictive than it was previously; and 3) comparative reciprocity, where Side A responds to the *difference* between the two side's prior actions. If its own side has been more cooperative than Side B in the immediate past, Side A will become *less* cooperative (i.e., act so as to reduce the gap in behavior). Conversely, if its own side has been more conflictive than Side B recently, Side A will next act *less* conflictively.

Stoll and McAndrew (1986) used data collected by Jensen (1984) on three U.S.-Soviet arms negotiations to test the relative predictive power of models based on each of these three types of reciprocity. Overall, they found most support for the comparative reciprocity model—i.e., both the U.S. and the Soviet Union tended to adjust their degree of concessions in a given round of ongoing negotiations to reduce the gap in cooperativeness between the two sides evident in the previous round Neither the trend model nor the simple reciprocity model had much success in accounting for the actions of either side

Druckman and Harris (1990) also investigated these three reciprocity models. Their data also were derived from negotiations—five arms control negotiations between the United States (or Western nations) and the Soviet Union (or Eastern-bloc nations), one of which was studied also by Stoll and McAndrew, and one negotiation about base-rights between the United States and Spain.

Druckman and Harris found clear support for the comparative model in all of the negotiations studied, although the model fit one side better than the other in some negotiations and it operated in an *inverse* fashion for the Western nations in one arms negotiation (i.e., the West's current behavior tended to increase the gap in concessions shown in the prior round).

The trend model was much less successful than the comparative model in predicting negotiation behavior. Moreover, the direction of the actor's behavior, in response to trends in the other side's behavior, was very inconsistent. National leaders were as apt to change their behavior in a direction opposite to a trend in the opponent's prior behavior as to change in a direction consistent with the opponent's behavior trend.

The simple reciprocity model also did not fit Druckman and Harris' data well. The correlation between each side's concession behavior in a given negotiation round and the behavior of its opponent in the prior round generally was small. Moreover, the relation-

ships were negative in about half the cases—i.e. the actor acted oppositely to its opponent's prior actions.

In a follow-up to the Druckman-Harris study, Bericker and Druckman (1991) examined the Lausanne peace negotiations of 1922–1923. They found support for the comparative model of reciprocity and no support for either the simple reciprocity or trend reciprocity models.

Overall, the studies of negotiations suggest that, of the three reciprocity models considered, the comparative reciprocity model best describes the interaction between national leaders. However, to our knowledge, the adequacy of these alternative models has been studied only for negotiations, primarily on arms issues. The fit of these models of reciprocity have not been compared for interactions with respect to varying issues or for interaction outside the framework of a formal negotiation. Druckman (1990) has recognized the limitations of prior studies on this subject, noting, "Less clear is whether the theories also capture the kinds of interaction that occur between decision-makers outside of negotiation settings" (Druckman, 1990:569).

The present study is an effort to apply the three models used in the negotiation studies—simple reciprocity (tit for tat), trend reciprocity, and comparative reciprocity—to events data describing the patterns of interaction between the United States and the Soviet Union over almost the entire Cold War period.

In applying the comparative model (the one most successful in describing negotiation behavior) we take into account a factor not addressed in previous studies. There is a probable correlation between a) the extent to which side A's recent past actions are different from those of its rival in a given period and b) the extent to which side A's recent actions deviate from the mean level of its own actions over some longer prior period. If side A changes its current behavior (say, in a more cooperative direction), this change may be simply a movement back to its usual level of cooperativeness ("regression to the mean") rather than due to a desire to match its rival's behavior more closely. Therefore, we included the deviation of an actor's recent behavior from its usual behavior in our representation of the comparative model.

While we take into account the deviations of each actor's actions from its usual level (over a one-year period), our focus is on the extent, and especially the nature, of reciprocity over short time periods—usually days or weeks. Rajmaira and Ward (1990; see also Ward and Rajmaira, 1992) have suggested that reciprocity may occur over very long time spans (many years) during which the actions

of nations may "drift together." While such possible long-term movements should be kept in mind, they are not a subject of the present research.

DATA

Two sources of data on U.S.-Soviet interaction were used. One is the Conflict and Peace Data Bank or COPDAB (Azar, 1980). The other is the World Event Interaction Survey or WEIS (McClelland, 1968). Both of these data sets contain information obtained from daily media concerning the actions that leaders of each nation took toward the other nation. Each data set uses a different scheme to code the data but both permit assessment of the degree of cooperativeness or conflictiveness of each action.

Measures of the cooperativeness-conflictiveness of each nation's actions based on the COPDAB versus the WEIS data are only moderately correlated (Howell, 1979). Thus, each data set provides a somewhat different record of the interaction.

From three separate sources we obtained COPDAB data on U.S.-Soviet interactions covering the period 1948–1986. COPDAB data for the years 1948–1978, originally gathered by Edward Azar, were obtained from the Inter-university Consortium for Political and Social Research. COPDAB data for 1979–1984 were gathered by Daniel Frei and Dieter Ruloff in Switzerland and coded by them using the same procedures as those used by Azar.[2] Data for 1985–1986 were gathered by a research group at the Free University of Berlin, using similar procedures.[3]

COPDAB codes each event into one of fifteen categories, ranging from the most conflictive actions to the most cooperative actions. In this study we have weighted the original COPDAB scores to reflect the degree of conflictiveness or the degree of cooperativeness represented by each action, using the weighting scheme developed by Azar and Havener (1976).

WEIS data for the years 1966–1978, gathered originally by Charles McClelland, were obtained from the Inter-university Consortium for Political and Social Research. WEIS data for the years 1979–1987 were produced by the U.S. National Security Council. Gaps in the data for these years were filled in by Professors Rod Tomlinson and Joshua Goldstein, who also have worked with these data.[4]

Twenty-two major categories of actions are coded by WEIS. The original codings do not order the categories with respect to cooperation or conflict. However, in this study we assigned scores representing the degree of cooperativeness or conflictiveness repre-

sented by each category, using a scheme developed by Calhoun (as reported by Sigler, 1972).

If either nation took more than one action on a given day, as recorded in either COPDAB or WEIS, the scores of those actions were averaged and treated as a single action in that particular data set. If a nation took no action toward the other on a given day, that day was not included in our data set for that nation.

OPERATIONALIZATION OF MODELS

Measures

To our knowledge, a detailed measurement of sequences of discrete actions by two nations over a period of many years has not previously been done. The conceptual variables in the models—especially in the trend reciprocity and comparative reciprocity models—may be measured in a variety of ways. Our procedures and their rationales may be stated for each of the major variables.

Change in the Actor's Behavior. Both the trend reciprocity model and the comparative reciprocity model are concerned with predicting change in the actor's behavior as a consequence of prior actions by one or both sides. We wanted, therefore, to compare the actor's current behavior to a measure of its prior behavior. A measure of prior behavior needs to be based on a sufficient number of actions so that it is not influenced greatly by a single idiosyncratic action. At the same time we wanted to have a base of prior action that was recent enough so that any difference between current and past action reflects a recent change. The measure we chose is the difference between the actor's current action and the average of its three prior actions toward the other side. (This measure generally spans a period of about one week prior to the current action.)

Trend in Other Side's Actions. To measure any trend toward greater cooperativeness or greater conflictiveness in the other side's (X's) behavior (the key predictor variable in the trend reciprocity model), we needed to compare the most recent behavior of the other with its behavior at a somewhat earlier time. We wished to include enough behaviors in both the earlier and the later time periods so that any changes would be meaningful. At the same time, we did not want to go so far back in time that change in X's behavior from the earlier to later period would no longer be very salient to the rival's (Y's) leaders. We choose to measure the trend in the other side's (X's) behavior by the difference between the average of its three most recent actions and the average of the three actions just prior to those (i.e., the measure spans the six actions of X prior to Y's cur-

rent action). Typically, the measure of the trend in the other side's actions covers a span of almost three weeks prior to the actor's current action.

Difference Between Recent Actions of Two Sides. To compare the recent actions of each side toward the other, we took the difference between the average of the actor's (Y's) three actions prior to its current action and the average of the other's (X's) three actions prior to Y's current action. Our rationale was similar to that used in devising the other measures. We wished to include enough prior actions by each side so that the measure was not affected greatly by a single idiosyncratic action. We also wanted this measure to cover a period recent enough so that it would be very salient to the decision-makers and thus might have a stronger effect on their actions than would a more distant comparison. Typically, the measure of difference between the recent actions of the two sides spans a period of about one and a half to two weeks prior to the actor's current action.

Deviation of Own Recent Actions from Yearly Mean. To measure this variable (used as a control in the comparative reciprocity model), we used the difference between the mean of the actor's three actions prior to its most recent action and the mean of its actions for that calendar year. It would have been preferable to compare the mean of the actor's most recent actions with the mean of its actions for the unique year prior to those recent actions. However, it would have been difficult to compute and use a unique yearly mean for the thousands of unique years prior to each trio of recent actions. The evidence indicates that the mean score of each side's actions in the calendar year in which a specific trio of behaviors occurred is correlated substantially with the average of its behavior in the year prior to those specific actions[5]. Thus, our measure appears to be an adequate, though rough, indicator of the extent to which the actor's recent actions deviated from its usual behavior during that general time period.

Other Variables

Lagged Variables. While most studies of reciprocity have not considered lagged effects, some studies of simple reciprocity have found that one side's actions can have effects on the other side's actions weeks later (Goldstein and Freedman, 1990; Goldstein, 1991. The present models do not include lagged variables of this sort. Such variables would not be appropriate for the comparative reciprocity model, at least as we have operationalized this model in terms of sequences of discrete actions. If we were to go back a substantial

number of prior actions for each side (i.e., much beyond the three prior actions used), it would be difficult to compare the actions of the U.S. and the Soviet Union because the time periods in which the prior actions of each side occurred (say the periods in which the 20th to 22nd prior actions of each side occurred) might be quite discrepant. Since our basic research aim is to compare the usefulness of the three models of reciprocity, we chose to omit lagged variables from all three models. The omission of lagged variables is a limitation that affects primarily the simple reciprocity model. The key predictor variables in the trend and comparative models typically cover a period of several weeks and so lags of the predictors appear less important for these models.

Inertia. Unlike the simple reciprocity model, the trend and comparative models do not include Y's own prior action as a predictor. We included Y's own prior behavior in the simple reciprocity model in order to capture any "inertia" or continuity effect on Y's behavior. But, in the trend and comparative models, the dependent variable is *change* in Y's behavior. A continuity effect (i.e., the tendency to continue any given kind of behavior) is not directly relevant to predicting the amount and direction of *change* of behavior.

Specification of Models

Next we specify the three models of reciprocity, as we have operationalized them.

Simple Reciprocity Model. The simple reciprocity model is represented as follows:

[1] $$Y_a = c + b_1 X_{a-1} + b_2 Y_{a-1} + e$$

where Y_a is Y's current action, X_{a-1} is X's most recent action prior to Y's current action, Y_{a-1} is Y's most recent action prior to Y's current action, c is a constant, b_1 is a coefficient indicating the strength of the relation between X_{a-1} and Y_a, b_2 is a coefficient indicating the strength of the relation between Y_{a-1} and Y_a, and e is the error in the estimation of Y's current action.

In verbal terms, this model predicts that each nation's actions at a given time will be determined by some constant tendency in its actions toward that nation, plus the prior action of the other nation, plus its own prior action (an inertia or continuity effect), plus some error.

Trend Reciprocity Model. Our specification of the trend reciprocity model is as follows:

[2] $$Y_a - Y' = c + b(X' - X'') + e$$

where

$$Y' = \frac{Y_{a-1} + Y_{a-2} + Y_{a-3}}{3}$$

$$X' = \frac{X_{a-1} + X_{a-2} + X_{a-3}}{3}$$

$$X'' = \frac{X_{a-4} + X_{a-5} + X_{a-6}}{3},$$

and Y_a is Y's current action. Y_{a-1}, Y_{a-2}, etc. are the most recent prior action of Y, the second most recent action of Y, etc., X_{a-1}, X_{a-2},etc. are the most recent action of X (prior to Y_a), the second most recent action of X, etc., c is a constant, b is a regression coefficient including the strength of the relation between Y_a and the recent trend in X's actions.

In verbal terms, this model predicts that change in Y's actions toward X (in relation to the average of its recent actions) will be determined by a constant tendency to change in a certain way (toward greater conflictiveness or toward greater cooperativeness); plus the recent trend (positive or negative) over the six prior actions by X; plus an error term.

Comparative Reciprocity Model. The model of comparative reciprocity is specified as follows:

[3] $$Y_a - Y' = c + b_1(X' - Y') + b_2(Y_a - \overline{Y}_{Yr}) + e$$

where

$$Y' = \frac{Y_{a-1} + Y_{a-2} + Y_{a-3}}{3}$$

$$X' = \frac{X_{a-1} + X_{a-2} + X_{a-3}}{3}$$

$$\overline{Y}_{Yr} = \text{mean Y for Year}$$

In verbal terms, this model predicts that change in Y's actions toward X at a given time (along the continuum of conflictiveness-cooperativeness) will be determined by its own constant tendency to change in a positive or negative direction; plus the difference in recent behavior between X and Y; plus the extent to which Y's recent behavior has deviated from its mean for the calendar year (included as a control variable), plus some error in the prediction.

ANALYSIS METHODS

Time series regression was used to test each of the three models of interaction (Ostrom, 1990; Chatfield, 1989). For each model and each type of data (COPDAB and WEIS), time series regressions

were run for each year separately and for all years combined[6]. The regressions also were run separately for the United States as actor and the Soviet Union as target, and vice versa.

Corrections for possible autocorrelation were included in each analysis. In the analyses using the trend reciprocity model and the comparative reciprocity model, the Durbin-Watson test was used to test for autocorrelation of the error terms in the dependent variable (Ostrom, 1990). Using estimated generalized least squares procedures, each equation was re-estimated with corrections for autocorrelation.

When estimating the simple reciprocity model, the problem arises that a lagged endogenous variable (Y_{a-1}) is correlated with the error terms for the current dependent variable (Y_a). To deal with this problem, the instrumental variable method was used to estimate Y_{a-1} (Pindyck and Rubinfeld, 1981; Ostrom, 1990)[7]. The presence of a lagged endogenous variable also requires that a test for autocorrelation of errors other than Durbin-Watson be used. We used both the Ljung-Box and Box-Pierce tests for autocorrelation in the simple reciprocity model (Micro TSP Manual, 1990). With samples of this size, these tests gave consistently similar results.

It should be noted that, while our data meets the basic requirement of time series analysis that the observations be in chronological order, the observations are not all equally spaced in time, as is common in time series analysis. For example, the last Soviet action prior to a given American action may have occurred one day, two days, three days, or more before the American action. The time interval between an action of one side and the next action of the other side generally did not vary greatly. For both U.S. and Soviet actions, the median time since the prior action of the other side was 2 days (using either data set). For both nations, about 70 percent of the prior actions of the other side occurred within 3 days (WEIS) or 4 days (COPDAB); about 80 per cent of the other side's actions occurred within the past week (7 days for COPDAB, 6 days for WEIS); about 90 per cent of all actions occurred within a few days more than a week[8].

Our use of a sequence of actions that is chronologically ordered but not equally spaced reflects the actual sequence of events. Moreover as Dixon (1988) notes, it would be unreasonable to suppose that decision-makers perceive the actions of another nation in terms of uniform time segments. He notes that "the precise time span between two events is (within some limit) considerably less relevant than their sequence of occurrence." (Dixon, 1988:24) Though our analysis methods differ somewhat from those of Dixon, we share his

belief that it is preferable to deal with the real-world sequence of discrete behaviors (which are not spaced exactly equally) than to average behaviors over uniform time periods.[9]

However, there is a possibility that the effect of one nation's action on the other nation's following action will differ for different time intervals between the actions of the two sides. (The simple reciprocity model is most relevant in this context.) To check on this possibility, we ran the time series regression analyses (for all years combined) separately for those action sequences where the actions of nation A preceded the actions of nation B by one day, by two days, by three days, and by four or more days. Separate analyses were performed with the U.S. as the responder and with the USSR as responder. These separate analyses (using either COPDAB or WEIS data) indicate that the regression coefficients measuring the effect on each nation's actions of the preceding actions by the other nation vary only slightly as the time interval between the two sides' actions varies. Furthermore, there is no trend toward either a stronger or a weaker effect of the other side's prior actions as the interval increases. These results provide some reassurance that the somewhat unequal time intervals between observations do not lead to any substantial hidden variations in our results.

RESULTS

We next present results for each of the models of reciprocity, examine the correspondence in results among models and between data sets, and consider variations in reciprocity over time.

Simple Reciprocity Model

Table 1 summarizes the results of analyses which used the simple reciprocity model, for all years combined. Looking first at results for the United States, the type (conflictiveness-cooperativeness) of American action has a positive but small correlation with the type of prior Soviet action. When the prior actions of the United States are held constant, the effect of prior Soviet actions on American actions is reduced (standardized b or Beta weight = .11) but remains significant in the regression analysis using COPDAB data. When WEIS data are used in the multiple regression, prior Soviet actions no longer have a significant effect on American actions.

When the Soviet Union is the actor, there is a small but positive correlation between Soviet actions (conflictive-cooperative) and prior American actions. When prior Soviet actions are held constant, the effect of prior American actions is reduced to a small

magnitude but remains significant both for the COPDAB data (Beta weight or Beta for short = .08) and for the WEIS data (Beta = .09).

Table 1
Results for Simple Reciprocity Model, Predicting to Conflictiveness-Cooperativeness of Current Action, All Years Combined[a]

	N	Constant	Other's Prior Action		Own Prior Action[b]		R^2
			r	Beta	r	Beta	
U.S.							
COPDAB	3394	-1.50	.19⊗	.11⊗	.20⊗	.45⊗	.08
WEIS	2477	0.11	.16⊗	-.05	.19⊗	.28◊	.02
U.S.S.R.							
COPDAB	3317	-2.89	.17⊗	.08⊗	.20⊗	.47⊗	.08
WEIS	2361	-0.25	.17⊗	.09⊗	.18⊗	.43⊗	.06

[a] These results have been corrected for autocorrelation.
[b] Own prior action was estimated using the method of instrumental variables (see footnote 7).
◊ significant at .10 level, ∅ significant at .05 level, ⊗ significant at .01 level (all two-tail tests)

Both the COPDAB and WEIS analyses also indicate that the actions of American and Soviet leaders were related much more strongly to their own immediately prior actions than to the immediate prior actions of the rival. In other words, each side's current actions appear to be more a continuation of previous behavior than a reaction to the rival's prior behavior.

Overall, the simple reciprocity model explains about 8 percent of the variance in each side's actions using the COPDAB data. For the WEIS data the simple reciprocity model explains about 6 per cent of the variance in behavior for the Soviet Union but only about 2 percent for the United States.

We also applied the simple reciprocity model to the data for each year separately.[10] Table 4, Part A summarizes the results for the simple reciprocity coefficients (Betas) in the separate years. (There are 39 years for COPDAB and 22 years for WEIS.)

For the United States as actor, a substantial, but not overwhelming, majority of the reciprocity coefficients are in the predicted positive direction (69% for COPDAB, 59% for WEIS). However, the simple reciprocity coefficients are almost never significant; none of 27 positive coefficients is significant with the COPDAB data and none of the 13 positive coefficients is significant with the WEIS

data. (Using COPDAB, one negative coefficient for the year 1981 is significant at the .10 level.) The median size of the positive reciprocity coefficients for separate years is small (.12 for COPDAB, and .09 for WEIS). The median size of the negative coefficients is even smaller.

Results for the Soviet Union generally are similar to those for the United States. Most of the reciprocity coefficients in single years (28 of 39 for COPDAB, 18 of 22 for WEIS) are positive. In only four years (1959, 1960, 1975, 1981) using the COPDAB data, and in only one year (1987) using the WEIS data, are positive coefficients statistically significant. [In one year (1951), using COPDAB data, a *negative* reciprocity coefficient was significant.]

The median size of positive reciprocity coefficients (Betas) for the Soviets is .12 for COPDAB and .11 for WEIS data while the median size of negative reciprocity coefficients is even smaller.

Do results based on the simple reciprocity model show evidence of mutuality in the behavior of American and Soviet leaders? In the five years in which reciprocity coefficients for Soviet actions were significantly positive (for either the COPDAB or WEIS data) there was a significant reciprocity coefficient for American actions in only one year (1981) and then the reciprocity coefficients for the two rivals were in opposite directions. In the one year (1951) in which a reciprocity coefficient for the Soviets was significantly negative (i.e. they reacted in a direction opposite to American actions), the reciprocity coefficient for American actions was not significant. Thus, the evidence from the simple reciprocity model does not indicate mutuality in the ways in which American and Soviet leaders responded to the actions of the other side.

Trend Model

Results of the analyses for the trend model, for all years combined, are shown in Table 2. Looking first at results for the United States, when COPDAB data (1948–1986) are used, there is no relationship at all between the trend in recent Soviet behavior (i.e., the extent to which they became more cooperative or more conflictive) and the direction of change in current American behavior. When WEIS data (1966–1987) are used, there is a very small (Beta = -.05), but statistically significant *negative* relation—i.e. American actions tended to change very slightly in a direction opposite to recent changes in Soviet actions. For analyses using either COPDAB or WEIS data, a negligible portion (less than 1%) of the variance in U.S. behavior is explained by the trend reciprocity model.

Table 2
Results for Trend Model, Predicting to Change in Conflictiveness-Cooperativeness of Action[a], All Years Combined[b]

	N	Constant	Trend in Recent Action of Other Side[c] r	Beta	R^2
U.S.					
COPDAB	3392	0.002	-.01	.00	.00
WEIS	2466	0.000	-.05∅	-.05∅	.01
U.S.S.R.					
COPDAB	3301	0.012	-.05∅	-.04∅	.01
WEIS	2360	-0.004	-.08⊗	-.08⊗	.01

a High score indicates that actor's current action was more cooperative than the mean of his three prior actions.
b All results have been corrected for any autocorrelation.
c High score indicates that other side's actions had become more cooperative (less conflictive) recently
∅ significant at .05 level, ⊗ significant at .01 level (all two-tail tests)

For the Soviet Union for all years combined, there are very small but statistically significant relationships between Soviet behavior and the trend in prior American behavior. This is true both when COPDAB data and when WEIS data are used. However, as was true for changes in American behavior, current change in Soviet behavior is related *negatively* to the prior trend of the rival—i.e. Soviet behavior tended to change slightly in a direction opposite to the trend in recent American behavior. For all years combined, the trend model explains a negligible (less than 1%) amount of the variance in Soviet actions, in analyses using either data set.

When we apply the trend model to American actions in separate years (see Table 4, Part B) we see that the negative relationship between the trend in recent Soviet actions and current change in U.S. action tended to occur in separate years as well as for all years combined. This is especially true when WEIS data are used. There are a larger number of Betas in a negative direction than in a positive direction and, of the six significant Beta coefficients in both data

sets, five (1958, 1979, 1981, 1985, 1987) are in a negative direction, while only one (1976) is positive.

The median size of negative trend reciprocity coefficients (Betas) is quite small (-.09 for COPDAB, -.07 for WEIS) and the median size of trend coefficients in the positive direction is even smaller.

When the trend model is applied to change in Soviet actions in each year separately, the results also show a predominance of negative relationships, especially for analyses using WEIS data. In seven years (1948, 1959, 1966, 1973, 1980, 1982, 1986) there are significant negative Beta coefficients in analyses using either the COPDAB or WEIS data, indicating *inverse* Soviet reaction to recent trends in American behavior. In no year is there a significant positive Beta coefficient indicating a change in Soviet behavior in the *same* direction as the recent trend in American behavior.

Is there any parallel between the tendencies of American and Soviet leaders to respond to the trends in the actions of the rival? There is no year in which the actions of both nations were related significantly to the trend in the rival's actions. However, the latter part of the Cold War, from 1979 to 1987, is a period in which both sides showed significant inverse reactions to trends in the rival's behavior in a number of years, as indicated primarily in the WEIS analyses. In three pairs of years (1979–80, 1981–82, and 1985–86), American behavior in a direction opposite to the Soviet trend in one year was followed by the same "inverse trend reciprocity" in Soviet behavior the following year.

Comparative Reciprocity Model

Table 3 shows the basic results for the comparative reciprocity model for all years combined. These results are very similar for both the United States and for the Soviet Union. Results also are similar for the COPDAB data and for the WEIS data.

The comparative term (i.e., the difference in recent actions by the two sides) has consistent, though modest correlations (generally close to .30) with change in action by each side. The more the recent actions of the two sides differed, the more the actor changed its behavior in a direction which reduced this difference. However, when we control for the extent to which the actor's recent actions deviated from its yearly mean score, the impact of the comparative term (as shown by the Betas) becomes very small, although still statistically significant.

The "deviation from the mean" term has moderate correlations (in the .40s) with change in the actor's current behavior, i.e., the

more the actor's recent behavior deviated from its average yearly behavior, the more its current action tends to move back toward the mean. The effects of the "deviation from the mean" terms are not reduced when these effects are controlled for the effect of the comparative term (i.e., the difference in recent action of the two sides); the Betas of the deviation-from-the-mean terms remain fairly strong.

Table 3
Results for Comparative Model, Predicting to Change in Conflictiveness-Cooperativeness of Action[a], All Years Combined[b]

			Differences Between Prior Actions of Two Sides[c]		Deviation of Own Prior Actions from Yearly Mean[d]		
	N	Constant	r	Beta	r	Beta	R^2
U.S.							
COPDAB	3394	+.13	.30⊗	.07⊗	-.48⊗	-.45⊗	.23
WEIS	2476	+.04	.24⊗	.05∅	-.45⊗	-.42⊗	.20
U.S.S.R.							
COPDAB	3320	-.24	.31⊗	.04∅	-.44⊗	-.44⊗	.22
WEIS	2361	-.06	.31⊗	.05∅	-.45⊗	-.44⊗	.21

a High score indicates that actor's current action was more cooperative than the mean of its three previous actions.
b All results have been corrected for any autocorrelation.
c High score indicates actor was less cooperative than other side in recent past (three prior actions of each).
d High score indicates own recent actions were more cooperative than own mean score for current year.
∅ significant at .05 level, ⊗ significant at .01 level (all two-tail tests)

Together, the combination of the comparative term and the deviation-from-the-mean term generally explain a little over 20 percent of the total variance in the change in each actor's behavior toward the other.

How well does the comparative reciprocity model fit the data for separate years? Relevant data are shown in Table 4, Part C. For the United States, most of the Betas for the comparative reciprocity variable are in the predicted direction, both for COPDAB data (27 of 39 years) and for WEIS data (15 of 22 years)—i.e., U.S. leaders tended to change their current behavior in a direction that reduced the discrepancy between the two sides recent behaviors. For COPDAB data, Betas for the comparative factor are significant in

seven of the 39 years (1951, 1953, 1961, 1966, 1977, 1982 and 1984). For one year (1981) there is a significant coefficient in the direction opposite from that predicted. For the WEIS data, Betas for the comparative factor in the predicted direction are significant in only two of twenty-two years (1980 and 1986). There are no significant Betas in the direction opposite to that predicted for the WEIS data. The median size of all positive comparative reciprocity coefficients (significant or not) is .13 for COPDAB data and only .07 for WEIS data. The median size of all negative coefficients is slightly smaller.

Table 4
Comparison of Reciprocity Coefficients (Betas)
In Separate Years, for Each of Three Models

	Direction of Betas		Median Size of Betas	
	Positive[a]	Negative[a]	Positive	Negative
A. Simple Reciprocity Model				
U.S. as Actor				
COPDAB	27 (0)	12 (1)	.12	-.10
WEIS	13 (0)	9 (0)	.09	-.05
U.S.S.R. as Actor				
COPDAB	28 (4)	11 (1)	.12	-.07
WEIS	18 (1)	4 (0)	.11	-.05
B. Trend Reciprocity Model				
U.S. as Actor				
COPDAB	19 (1)	20 (2)	.06	-.09
WEIS	6 (0)	16 (3)	.04	-.07
U.S.S.R. as Actor				
COPDAB	17 (0)	22 (3)	.09	-.09
WEIS	3 (0)	19 (4)	.08	-.09
C. Comparative Reciprocity Model				
U.S. as Actor				
COPDAB	27 (7)	12 (1)	.13	-.12
WEIS	15 (2)	7 (1)	.07	-.05
U.S.S.R. as Actor				
COPDAB	27 (5)	12 (1)	.11	-.10
WEIS	18 (1)	4 (0)	.06	-.06

a The number of relationships significant at .10 level or beyond (2-tailed test) are shown in parentheses.

For the Soviet Union, as for the United States, changes in current behavior during most years tended to be in the direction of reducing recent differences in the cooperativeness of the two sides.

For the COPDAB data, Beta coefficients for the comparative factor were in the predicted direction for twenty-seven of thirty-nine years; for the WEIS data these Beta coefficients were in the predicted direction in eighteen of twenty-two years.

However, the size of the Beta coefficients generally were quite small. For COPDAB data, the Beta coefficients for the comparative reciprocity variable were statistically significant in the predicted direction in five of thirty-nine years (1956, 1960, 1977, 1980, and 1986); there was a significant Beta coefficient in the direction opposite to that predicted in one year (1951). For the WEIS data for the Soviet Union, there was only one significant Beta coefficient for the comparative factor—that in the predicted direction in 1971.

Did the patterns of comparative reciprocity for the two rival nations correspond—i.e., did they reciprocate at the same time? There were three years—1977, 1980, and 1986—in which the comparative reciprocity coefficients for both sides were significant in the predicted direction in either the COPDAB or WEIS data. There was one year (1951) in which the two sides reacted to each other in opposite ways—the United States following a pattern of comparative reciprocity but the Soviet Union following a pattern of inverse comparative reciprocity (i.e. changing its current behavior in a way which increased the prior discrepancy). In no other year did the actions of both nations show clear evidence of comparative reciprocity (in either direction).

We may consider also whether, for separate years, the actions of each nation's leaders were affected by the extent to which their own recent actions had deviated from their average level of conflictiveness-cooperativeness for that year. The results (not shown) indicate that, for both the United States and the Soviet Union, change in current action consistently moved in the direction of their overall mean level of conflictiveness-cooperativeness.

For the United States, the effect of the "prior deviation from the mean" factor was in the predicted direction for every year in both the COPDAB and the WEIS data. Although the size of the coefficients varied somewhat, they were almost always substantial, with the median coefficient being .45 both for the COPDAB data and for the WEIS data. The Beta coefficients for the "prior deviation from the mean" factor were statistically significant (usually highly so) for the U.S. in all but two of thirty-nine years for the COPDAB data and for all twenty-two years for the WEIS data.

For the Soviet Union as well, the Beta coefficients for the "prior deviation from the mean" factor was in the predicted direction in every year for both the data sets, with a median yearly Beta of .46

for the COPDAB data and a median yearly Beta of .45 in the WEIS data. These Betas were statistically significant—usually highly so—in thirty-five of thirty-nine years for the COPDAB data and in twenty-one of twenty-two years for the WEIS data. Clearly, whenever either side's prior recent behavior had deviated from its mean level of conflictiveness-cooperativeness in that year, its current action tended to move back toward the mean.

Correspondence Among Models And Data Sets

To what extent did the three different reciprocity models show similar results in the same years? To answer this question, we may see in how many years significant reciprocity coefficients were found for each nation in more than one reciprocity model (see Table 5).

For the United States as an actor, over the whole period from 1948 through 1987 there was only one year (1981) in which two or more of the reciprocity models (using *either* data set) showed significant reciprocity coefficients. For that year (the first year of the Reagan administration), all three of the models showed significant *inverse* reciprocity—i.e., American leaders tended to react in a way opposite to the last Soviet action, opposite to the trend in recent Soviet actions, and opposite to a way which would have reduced the recent discrepancy between the actions of the two sides. In no other year were there significant reciprocity coefficients for the United States in more than one model.

For the Soviet Union as actor, there also is little agreement in the results of the three reciprocity models. In only two years (1951 and 1960) were there significant and consistent reciprocity coefficients for the Soviets in more than one model; both the simple reciprocity and the comparative reciprocity models (but not the trend model) indicated that the Soviet Union responded in a way *opposite* to reciprocity in 1951 but consistent with reciprocity in 1960. For 1959 the simple reciprocity model indicated that Soviet leaders showed positive reciprocity, and in 1980 and in 1986 the comparative model showed positive reciprocity, but in these three years the trend model indicated significant *negative* reciprocity for the Soviets.

Overall, then, there is little agreement for either nation in the results obtained from the three models.

Table 5
Significant Beta Coefficients, By Year, for the United States and the Soviet Union,
Using Each of Three Reciprocity Models Applied to COPDAB(C) and to WEIS(W) Data

	Simple Reciprocity Model				Trend Reciprocity Model				Comparative Reciprocity Model			
	U. S.		U.S.S.R.		U. S.		U.S.S.R.		U. S.		U.S.S.R.	
	C	W	C	W	C	W	C	W	C	W	C	W
1948							-.16∅					
1951			-.26∅						.29∅		-.29∅	
1953									.28⊗			
1956											.40◊	
1958					-.23◊							
1959			.18◊				-.20⊗					
1960			.22◊								.46◊	
1961									.22∅			
1966							-.19∅		.18◊			
1971												.22◊
1973								-.13◊				

◊ significant at .10 level, ∅ significant at .05 level, ⊗ significant at .01 level (all two-tail tests)
Shaded area designates years not covered by the data set.

Table 5 (continued)
Significant Beta Coefficients, By Year, for the United States and the Soviet Union,
Using Each of Three Reciprocity Models Applied to COPDAB(C) and to WEIS(W) Data

	Simple Reciprocity Model				Trend Reciprocity Model				Comparative Reciprocity Model			
	U. S.		U.S.S.R.		U. S.		U.S.S.R.		U. S.		U.S.S.R.	
	C	W	C	W	C	W	C	W	C	W	C	W
1975			.27◊									
1976					.34◊							
1977									.24∅		.20◊	
1979						-.26⊗						
1980								-.20∅		.33⊗	.36⊗	
1981	-.12◊		.22∅		-.12◊				-.21∅			
1982								-.24⊗	.15∅			
1984									.13◊			
1985						-.13∅						
1986								-.23⊗		.28⊗	.40∅	
1987				.17◊		-.19∅				-.16◊		

◊ significant at .10 level, ∅ significant at .05 level, ⊗ significant at .01 level (all two-tail tests)
Shaded area designates years not covered by the data set.

It may be noted too that there is very little agreement between results based on COPDAB data and those based on WEIS data, regardless of what reciprocity model was used. For the years in which both COPDAB and WEIS data are available (1966–1986), yearly analyses using all three of the reciprocity models, applied both to the U.S. and to the Soviet Union, yielded fourteen significant reciprocity coefficients using the COPDAB data and eleven significant reciprocity coefficients using WEIS data. In no case did results for a given model based on one data set and the parallel results based on the other data set both show a significant reciprocity coefficient for the same actor in the same year.

Variations In Reciprocity Over Time

Is there evidence, for either American or Soviet leaders, of greater reciprocation in some time periods than in others? To address the question, we may examine the years in which there were significant reciprocity coefficients in any of the models, using either COPDAB or WEIS data (see Table 5).[11]

The frequency of reciprocation by either side may be compared especially for four different phases of the Cold War (Patchen, 1992): 1) the early Cold War, 1948–1962; 2) a period of shift toward greater cooperation, 1963–1978; 3) a return to a high level of hostility ("Cold War II"), 1979–1984; 4) the decline and end of the Cold War, 1985–1987.[12]

During the first two of these periods (which spanned most of the Cold War), American leaders generally did not show significant reciprocity. But when they did so, it was almost always (six of seven years) of a positive kind, especially positive comparative reciprocity. However, during Cold War II, American reactions to Soviet behavior were more mixed—positive comparative reciprocity in three years but *inverse* reciprocity (of various types) in two of these years. In the more relaxed atmosphere following Cold War II, the nature of American reciprocity appeared to remain mixed. Overall, then, American leaders showed some tendency to reciprocate Soviet actions during most of the Cold War but were more varied in the nature of their reactions during Cold War II and after.

Soviet leaders were less likely than American leaders to show positive reciprocity during the early Cold War, especially at the beginning of that period. In four of these fifteen years, they showed positive reciprocity (either simple or comparative). But in three other years they displayed *inverse* reciprocity (of varied types).

During the period of improved superpower relations (after the Cuban missile crisis), the evidence (especially that based on the

comparative and simple reciprocity models) indicates a tendency for the Soviet leaders to reciprocate American actions in several years. However, there also is evidence of inverse trend reciprocity in two years.

The pattern of evidence for the Soviets is similar during the last two periods. Soviet leaders appear to have responded to American actions with simple reciprocity or with comparative reciprocity in several of these years. But they also appeared to respond with inverse trend reciprocity in some of these years.

Overall, the Soviets were most variable in their reactions to American behavior during the early Cold War. Thereafter, they tended toward reciprocity according to the simple reciprocity and comparative reciprocity models, but showed some inverse reciprocity according to the trend model.

In general, the results—especially those for simple and comparative reciprocity—tend to agree with Goldstein's (1991) findings that the U.S. reciprocated more during the earlier part of the Cold War and reciprocated less later while the reverse was true for the Soviet Union. It is noteworthy that reciprocity was not found to occur more in periods of relatively good relations between the superpowers than in years of relatively high conflict. In fact, for the United States, the reverse tended to be true. The United States displayed reciprocity during some of the years of greatest tension during the early Cold War and with the exception of 1981 (the first year of the Reagan administration) tended to follow a pattern of reciprocity during Cold War II as well. While the U.S. also showed reciprocity during some years of the intermediate period of better relations, there was no significant reciprocity in American actions during the height of "détente" from 1972 to 1975.

For the Soviet Union, too, reciprocity was *not* more characteristic of periods of good overall relations than of bad overall relations. Thus the Soviets displayed some reciprocity during some high-tension years of the early Cold War and during Cold War II as well as during some of the relatively tranquil intermediate years. They did not show consistent evidence of reciprocity during the height of "détente."

CONCLUSIONS

What do our results indicate about the adequacy of each of the three alternative models of reciprocity and about their relative validity?

First, the simple reciprocity model receives only limited support. For all years combined, the simple reciprocity coefficients are

small; these effects are significant for the Soviet Union using both COPDAB and WEIS data but are significant for the United States only when using COPDAB data. For the forty separate years, the reciprocity coefficients tend to be positive but, of these, none are significant for the U.S. and only a very few are significant for the Soviet Union using either COPDAB or WEIS data.

The present results are less supportive of the simple reciprocity model than are Goldstein's (1991) results for U.S. and Soviet reciprocation in daily interaction or than Dixon's (1988) results concerning American reciprocation of immediately prior Soviet actions. Differences among the results of these studies may be due to differences in methods used, such as the way in which the dependent variable of conflictive-cooperative behavior was constructed[13] and to different statistical procedures. Also, Goldstein included a number of lagged variables reflecting the other side's actions over a period of several months while the present model of simple reciprocity included only the last prior action of the other.

The inclusion of more lagged variables in our simple reciprocity model might have resulted in somewhat stronger reciprocity effects. (Use of more lagged variables in our other two reciprocity models may increase their predictive power also). Like our own work, most research on the simple reciprocity model has not included lagged effects beyond the last prior action or time period (e.g., Dixon, 1988; Rajmaira and Ward, 1990; Ward and Rajmaira, 1992) but lagged effects deserve more attention in further research.

Although it is possible that, because of its particular methods, our results underestimate the true extent to which American and Soviet leaders behaved consistently with the simple reciprocity model, even the results reported by Goldstein and by Dixon show only inconsistent support for the simple reciprocity model. Moreover, one would expect that if simple reciprocity had a substantial and robust effect on U.S. and Soviet actions, this effect would be more evident despite variations of method.

The trend reciprocity model receives almost no support from our results, either for all years combined or for single years. In fact, the results tend to be opposite to the trend reciprocity model—i.e., both American and Soviet leaders tended slightly to change their current behavior in a direction opposite to the recent trend in the rival's behavior. These results are consistent with the studies of arms negotiations by Stoll and McAndrew (1986) and by Druckman and Harris (1990), who found that American and Soviet negotiators often changed their degree of concessionary behavior in a direction opposite to the trend in concession by the rival. It may be that both

national actors sometimes saw the rival's trend toward more positive behavior as indicating exploitable weakness and/or a trend toward more negative behavior as requiring soothing.

However, the trend reciprocity model does not help us much to predict changes in behavior in either direction. Relationships are very tiny and usually insignificant, and the model explains almost none of the variance in behavior by either side. These results suggest that decision-makers generally do not react much to the trend *per se* in the behavior of the other side.

The comparative reciprocity model receives only weak support, but more consistent support than the other two models. For all years combined, the reciprocity coefficients are very small but significant for both the U.S. and the Soviet Union, using either data set. For individual years, the comparative reciprocity coefficients generally are in the predicted direction and, though the magnitude of relationships generally are small, there are many more years in which there are significant coefficients using the comparative reciprocity model (especially in the predicted direction) than when using the other two reciprocity models.

The fact that both the U.S. and the Soviet Union tended, albeit weakly, to follow a pattern of comparative reciprocity may indicate that decision-makers usually wish to maintain fairness in relationships, as posited by Druckman and his colleagues (e.g., Druckman and Harris, 1990). Minimizing differences between the other side's behavior and one's own behavior also may provide a useful decision rule in complex situations (Winham, 1977). In addition, behaving in terms of comparative reciprocity may be intended at times to encourage cooperative, or at least non-bellicose, behavior by the rival, by rewarding cooperative and punishing coercive actions according to a comparative standard that the other side can see as equitable.

The greater support found for the comparative reciprocity model over the other reciprocity models is consistent with the results found by Stoll and McAndrew (1986), Druckman and Harris (1990), and Bericker and Druckman (1991) in their studies of arms negotiations. The present results indicate that the usefulness of the comparative model is not limited to interaction in negotiations, but extends to a much broader range of interactions.

The fact that comparative reciprocity is weaker in the present results than in the negotiations studied by others may be due to the fact that negotiators are likely to focus their attention on a comparison of positions on a specific topic. By contrast, the events data used in the present study reflect actions taken by a variety of government officials on a variety of issues. However, even with the di-

verse types of actions by each side, comparative reciprocity did tend to occur. This may reflect in part the occurrence of some comparisons on specific issues but may also reflect a tendency to compare the overall cooperativeness of the two sides' actions without regard to specific issues.

When using the comparative reciprocity model, we found that a factor used primarily as a control variable—the extent to which the actor's recent behavior deviated from its mean level of conflictiveness-cooperativeness—had a substantial and consistent effect on the direction of change in its current behavior. Whenever the recent behavior of American or Soviet leaders deviated from the average level of their behavior over a longer period, they tended to move back toward their overall mean. This result is consistent with previous research on U.S.-Soviet interaction which indicates that a higher level of past behavior in one direction tends to lead to a change in the opposite direction (Ward, 1982; Bobrow, 1982; Thompson and Rapkin, 1982).

From one perspective, this result represents simply a statistical necessity; single actions tend toward the mean. However, there also may be a substantive process which tends to push leaders' actions toward the mean. They may wish to correct the "excesses" of previous conflictive or cooperative action. Such an underlying process is consistent with the view of Rajmaira and Ward (1990) who propose that norms of behavior arose to regulate superpower interactions and that foreign policy behavior returned to an equilibrium level when it had deviated from that level.

Overall, considering all three models together, the results do not suggest the robust presence of reciprocity. There is some reciprocity discernible when using the simple reciprocity model and especially the comparative reciprocity model but the effects are weak. Also, with only two exceptions, no two reciprocity models show significant and consistent reciprocity coefficients for the same actor in the same year.

The weak evidence for reciprocity may be due, at least in part, to limitations of the data and to the particular methods used. The event data used have a lot of "noise" in them, i.e., they give a rough and inexact measure of each nation's actions at a particular time (Achen, 1987). The measures of key variables (e.g., of difference in the prior actions of the two sides) also are only rough indicators of reality and other, perhaps more refined, measures, might be employed.

In addition, prior research (Bobrow, 1982; Ward, 1982; Rajmaira and Ward, 1990) indicates that reciprocation of the coopera-

tive actions of a national rival tends to be greater than reciprocation of conflictive actions, a distinction which is not captured in this study. Further analyses of the present data set, reported elsewhere (Patchen and Bogumil, 1995) indicate that comparative reciprocity in U.S.-Soviet interactions operated both with respect to more cooperative recent actions and with respect to more conflictive actions by the other side, but somewhat more strongly for cooperative actions.

However, in addition to possible methodological reasons, there are more substantive reasons why reciprocity may be weak in the results we report here. Previous research indicates that an actor (national or otherwise) will reciprocate his/her opponent's actions only under certain conditions (Patchen, 1991; Patchen, 1993). While this issue is not the focus of the present paper, the results presented here contain some intriguing indications that reciprocity was most likely to occur *not* when the overall relationship was most positive but at times of high tension and conflict. At such times rivals of roughly equal power may be especially desirous both of resisting encroachment by the other (by negative reciprocation) and of helping to reduce dangerous tensions (by positive reciprocation). These findings are generally consistent with those of Ward and Rajmaira (1992) for the years 1962–1988, especially their finding that the U.S. was most likely to reciprocate both conflictive and cooperative behavior by the Soviet Union during the early, most tension-filled years of the Reagan administration.

Our results also tend toward consistency with those of Leng (1993) who found that, during crises, nations defending the status quo were more likely than challenging nations to reciprocate actions of their adversaries. The United States was the status quo power during most of the Cold War and it was more likely than the challenger nation, the Soviet Union, to display reciprocity during most of this period, especially during the early Cold War when the challenge was most severe. Only during the Cold War II did the U.S. show equal or lesser readiness to reciprocate than did the Soviet Union. It can be argued that by this time American leaders tended to see themselves as the challenger to the status quo of Soviet control in Eastern Europe and areas of Africa, as well as to perceived Soviet military superiority.

Since there has been little research on the models of reciprocity used in this study, it would be desirable to investigate their applicability to interactions between other pairs of nations. Further research on these models might use alternative measures of the key variables in the models (e.g. of differences between the prior actions of the parties). In addition, future research could examine the fit of a

model which combines simple and comparative reciprocity—i.e. one which postulates that actor A reacts to a *combination* of the absolute nature of actor B's prior action *and* the difference in the prior actions of actors A and B. Further, models of reciprocity (in whatever form) can be compared to a learning model which postulates that each side's behavior depends on the success of its past actions (e.g., Rapoport and Chammah, 1965; Leng, 1983).

In testing any such models, it is important to keep in mind that reciprocity effects are likely to vary with actors whose basic relationships vary (e.g., in overall levels of conflict and cooperation) and who have varying expectations of the relative costs and benefits of conflict and cooperation. Thus, variations in reciprocity under varying conditions also need further study.

NOTES

[1] This is a revision of a paper presented at the annual meeting of the Peace Science Society (International) in Syracuse, New York in November, 1993.

[2] These updated COPDAB data were kindly made available to us by Professor William Zimmerman of the University of Michigan.

[3] These data were kindly provided to us by Dr. Wolf-Dieter Eberwein.

[4] We are grateful to Prof. Tomlinson of the U.S. Naval Academy and to Prof. Goldstein, then at the University of Southern California, for making these data available to us.

[5] For the U.S., the correlations between the mean action scores for successive years are .72 for COPDAB and .72 for WEIS. For the Soviet Union, the parallel correlations are .37 for COPDAB and .64 for WEIS. Since the mean score for the calendar year in which an action takes place overlaps the year prior to that specific action, the correlations between calendar years and prior years would be higher than these correlations reported for successive years.

[6] The TSP time series regression program (Micro TSP 1990) was used.

[7] X_{a-1} and X_{a-2} were used as instrumental variables. Y_{a-1} was regressed on X_{a-1} and X_{a-2} to get estimates of Y_{a-1} which would be uncorrelated with errors in Y_a.

[8] For the U.S. as actor, about 90 percent of prior Soviet actions occurred within 10 days (COPDAB), or 7 days (WEIS); for the USSR as actor, about 90 percent of prior U.S. actions occurred within 11 days (COPDAB) or 8 days (WEIS).

[9] We consulted on this issue with Professor Jerry Thursby of the Economics Department at Purdue University, an expert on use of time series regression.

[10] In general, the simple reciprocity model did not fit the data for single years well, as indicated by generally very tiny, and sometimes negative, R^2s, both for the United States and the Soviet Union as actors. (R^2s can be negative in two-stage least squares analyses.)

[11] Some caution must be exercised in comparing the size and significance of reciprocity coefficients among different years because the events data were coded by different teams at different times (see Data Section).

[12] The dates given here are those for which we have data. The Cold War actually began in 1946 and ended around 1990.

[13] We used weights for the WEIS data devised by Calhoun (Sigler, 1972) while Goldstein weighted the WEIS data by a different scheme and Dixon grouped the WEIS codes into positive, negative and neutral affect. The weightings used by us and by Goldstein for the COPDAB data appear to be the same.

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